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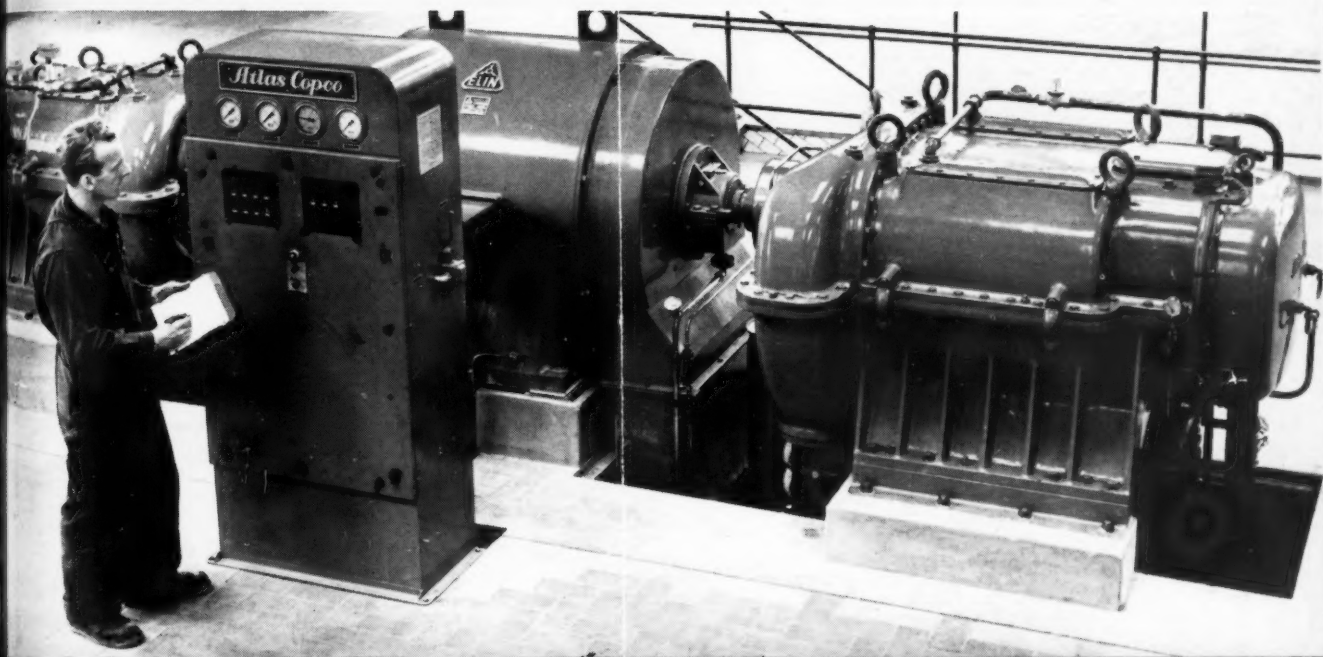
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The Mining Journal

LONDON, JULY 24, 1959

Vol. 253. No. 6466.

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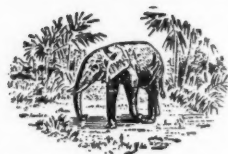
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The Mining Journal

London, July 24, 1959

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DISPUTE IN THE PRINTING INDUSTRY

While the present dispute in the printing industry continues, production of *The Mining Journal* is severely hampered. The size of each issue will continue to be governed by current circumstances, and certain regular features may have to be curtailed or omitted. From time to time there may also be some delay in distribution.

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Implications of the U.S. Steel Strike

THE steel industry might aptly be described as the barometer of the metal markets. When steel is prospering the outlook for almost all sections of the mining and metal industries is for rising consumption and maintained demand. Conversely, any significant decline in steel production is quickly reflected in contracting markets for the majority of ores and metals. With a peak output of 117,000,000 s.tons (in 1955) and a capacity estimated to be in the region of 140,000,000 tons per annum, the U.S. steel industry is by far the largest steel producer, and its progress is closely followed by economists throughout the world.

The threat of a strike in this mighty industry has been overhanging the commodity and stock markets for some considerable time. Now that it has materialised—and present indications point to a long and bitter struggle—it is appropriate to consider some of the broader implications for Free World ore and metal producers as a whole.

The immediate repercussions of a steel strike on other U.S. industries will in all probability be fairly limited, since stocks of steel have been widely accumulated by fabricators. No serious economic slowdown is anticipated, therefore, before the end of August. Meanwhile, increased demand for imported steel is already reflected in the rising prices asked by Japanese and European steel suppliers. Foreign steelmakers are alleged to be “making an all-out effort to take over the domestic market, during the strike”. They cannot be expected, however, to fill the gap of about 300,000 tons normally produced every day in the U.S. industry.

Like so many other strikes, the present one, the sixth in the U.S. steel industry since the end of World War II, is apparently wanted by nobody—not by the companies, who could look forward to a high level of demand throughout the rest of the year; not by the workers, who have embarked upon it without any marked enthusiasm; and certainly by neither the government nor the nation. Unfortunately, a show of toughness is hardly avoidable when long-term contracts of this nature come up for renewal (the last one was for three years, signed in 1956). This apart, there is the determination of employers to avoid a further round of the wage inflation which is becoming an increasing handicap to American manufacturers, both at home and abroad. The steel companies have become the spearhead of American industry in what has developed into a trial of strength between management and unions.

There have been clear indications that on the comparatively straightforward issue of hours and wages an acceptable compromise could be reached. The real stumbling block during the weeks of abortive negotiations has been the question of restrictive practices; who is to have the power of decision over the actual working operation of the mills, the management or the unions? This issue, again, is by no means peculiar to the steel industry, but is

today a pressing question in almost every major U.S. industry. It has a vital bearing on inflation and the cost-price spiral, for one of the chief factors determining the price of the product is the value which the worker is prepared to deliver in return for his hourly wage.

The fact that the problem of restrictive practices (which is also a key issue in the present printing dispute in Britain) should have become such a dominating factor in American industry is a sharp reminder of the extent to which the welfare mentality appears to have undermined the attitude of American labour. This trend is in keeping with inflation and the general tendency to sit back and coast which has become such a disturbing phenomenon in recent years.

The outcome of the steel strike will set a pattern for the non-ferrous industries and, indeed, for many industries remote from mining and metals. The United Steel Workers' Union has already made a wage proposal to the three major U.S. aluminium companies "identical" with its steel bargaining demands. In the copper industry, although the clash has been temporarily postponed, contracts have recently expired and it is evident that, whether or not a strike eventually takes place, the new agreements will be profoundly influenced by the terms which the steel workers are ultimately able to secure, as will the negotiations currently in progress between western zinc and lead producers and the union. Victory by the steel makers would, of course, stiffen all U.S. industry in the fight against what has come to be termed "feather-bedding".

Foreign producers of such non-ferrous metals as lead and zinc have little to gain from any increases in U.S. domestic prices resulting from further wage inflation, since the quantities that can be imported are governed by quotas, and the foreigners could only get a higher price on the proportion they were able to supply. Shortages would have to become very acute indeed for the government to take the domestically unpopular step of easing quotas. Meanwhile the steel strike is retarding the increase in zinc prices which otherwise might already have taken place and, if it goes on long enough, must eventually have unfavourable effects on the encouraging outlook for tin.

The strike has already affected workers in the railways, the Great Lakes shipping industry, and some coal mines. If protracted, it will mean more lay-offs in the U.S. iron ore mines, though operations in U.S.-controlled mines in other countries are unlikely to be affected.

In the event of victory for the steel workers, the only real gainer—apart from the foreign manufacturer—might well be the gold industry. A further round of inflation, by aggravating the present strain on the dollar, would certainly provide still further ammunition for the growing number of economists who regard a more realistic gold price as an essential step towards the rehabilitation of the American economy.

HEALTH AND WELFARE AT ELLIOT LAKE

Not the least impressive aspect of Rio Tinto's operations in Canada is the high regard which the Group's 6,000 workers have for their jobs and for the new community of Elliot Lake in which most of them live.

Dr. E. B. Gillanders, executive vice-president of the Rio Tinto Mining Co. of Canada Ltd., states that the payroll for all Rio Tinto employees in the Algoma uranium field is now well over \$2,500,000 each month. The average weekly earnings for all hourly rated workers in the mines of the Rio Tinto Group is \$112.05. By contrast, the highest

weekly earnings for any group, according to the Dominion Bureau of Statistics, is \$96.86 for the petro-chemical workers and the average for mining, other than gold, is \$90.45. The average for manufacturing generally is \$63.92.

In the interest of achieving the healthiest working conditions possible, Rio Tinto Group uranium mines have spent over \$5,000,000, the biggest single portion of which was for facilities to control dust and radioactivity. Fan capacities total about 3,000,000 c.f.m. or five tons of air for each ton of ore mined. The group's safety and health engineers believe that progress has reached the point where radioactivity is no longer a problem and dust counts have been greatly reduced. They consider that even better results can be obtained with the equipment they now have and look to employees to co-operate with Rio Tinto management to improve conditions still further.

In addition to the companies' expenditures to protect the health of employees at their mines, the Rio Tinto Group mines in Algoma have pledged \$635,000 towards the capital cost of the hospital constructed by the Sisters of St. Joseph.

Recognising that housing is a problem throughout Canada, especially acute in new communities, the Rio Tinto Group companies have provided accommodation in the way of houses, apartments, trailer parks and single men's quarters to the startling amount of \$17,500,000, and they bear continuous expense in maintaining some of the services. The basic facilities for recreation have also been supplied.

Apart from all their current expenditures on behalf of their employees, Rio Tinto Group companies have spent well over \$200,000,000 in bringing their mines into production and providing services beyond those actually involved in producing uranium.

DECLINE IN KOLAR GOLD RESERVES

According to Mr. B. D. Jatti, Chief Minister of Mysore, the development of West Reef in Nandydroog gold mine, Mysore, continues to be successful. At West Reef and Champion Reef mines, however, no new ore shoot of economic value has been discovered, and development work in Champion Reef mine has been suspended.

Mr. Jatti stated in the Mysore State Assembly that up to the date of nationalization, a large quantity of ore had been developed between the 38th and 60th levels in Nundydroog mine. Since nationalization, the upward continuation of this ore was being developed from crosscuts at the 1,450, 2,000, and 32nd levels. A crosscut was also being put out at the 2,600 level. In the Mysore mine, since nationalization, the development of West Reef has been intensified, involving an expenditure, up to the end of December last year, of Rs.1,827,150.

In the Champion Reef mine, a total of 15,580 ft. was driven on the West Reef, involving an expenditure of Rs.2,172,217 up to the date of nationalization. Diamond drilling was also undertaken. Owing to the disappointingly poor results obtained, however, the West Reef development work in this mine has been suspended.

The Government of India has decided to acquire at the official rate the entire production of the Mysore gold mines. Mr. Morarji Desai, Finance Minister, Government of India, said that this decision had been taken in order to acquire gold and strengthen the country's reserves. Mr. Morarji also said that the cost of production at the Mysore gold mines was higher, and the government was thinking of giving some subsidy.

The United States and World Resources of High Temperature Metals—II

With a melting point exceeded only by rhenium, tantalum, and tungsten, molybdenum is one of the best alloying elements for increasing the creep-resistance and strength of steels at high temperatures and for improving resistance to surface corrosion and also possibly intergranular corrosion.

Molybdenum is the only high-temperature metal with which the United States has a fully satisfactory domestic supply position, both world sources and production being dominated by that country. At least 92 per cent of all world molybdenum resources are believed to be contained in deposits in the western states of the United States, and of these 94 per cent is in the Climax deposit in Colorado. Most of the remainder is in porphyry copper deposits from which the molybdenum is obtained as a by-product.

The two main United States deposits are at the Climax mine in Colorado and the Questa mine in Taos County, New Mexico. Between them, these produce about 70 per cent of the United States output. The Urad mine near Berthoud Pass in Colorado has produced little. By-product recovery from porphyry copper-mining operations takes place in Utah, Arizona, New Mexico, and Nevada. A small amount of molybdenum is recovered as a by-product of tungsten mining at Pine Creek, California. It is expected that the ultimate total recovery of molybdenum as a by-product will increase to considerable proportions.

Outside the United States, the chief producer of molybdenum ore is Chile, whose entire production almost comes from the Braden porphyry copper deposit, though the amount obtained from the large copper deposit at Chuquibambilla is increasing. By-product molybdenum is also obtained from Peru, but exact reserves in Chile and Peru are difficult to estimate, especially since little work has been done on some of the more recently discovered deposits such as those at Toquepala and nearby in Peru.

Mexico has produced no molybdenum since the cessation of operations at the Cananea copper deposit. Production and known resources in Canada are small.

In Europe, the only significant deposits are at the Knaben mine in Norway, where the grade ranges between 0.15 and 0.50 per cent. Reserves of low-grade ore here may be large. Small deposits also occur in Finland, Greece, Yugoslavia, and Turkey.

Japan is the chief producer in Asia, but resources are small, and no increase appears likely. Small occurrences are known in Korea and China.

While the true reserves of the U.S.S.R. are not known, by-product molybdenum is undoubtedly being produced from its large, porphyry copper deposits, and large reserves may exist.

Known world reserves are estimated to be capable of producing 2,500,000,000 lb. of molybdenum metal.

Although the needs of the United States will probably increase considerably, no foreseeable demand is expected to exceed resources.

Tungsten

More common throughout the earth's crust than any other high-temperature mineral, tungsten is obtained from four minerals of commercial importance: scheelite and the three minerals ferberite, huebnerite, and wolframite, which are generally referred to as wolframite. Wolframite itself has widely variable percentages of iron and manganese; ferberite may contain up to 20 per cent $MnWO_4$ and huebnerite up to 20 per cent $FeWO_4$. Neither is ever completely pure. Powellite and cupro-scheelite sometimes occur in commercial quantities, usually associated with wolframite or scheelite.

World reserves of tungsten are estimated to be at least 175,000,000 tons of the oxide of tungsten (WO_3), the largest concentration of ores being in Asia, since most of the tungsten mineralization seems to be in a great belt bordering the Pacific Ocean. Major exceptions to this are the deposits in Portugal, Brazil, North Carolina, and scattered deposits in Europe. China has the largest reserves and is by far the largest producer, accounting for roughly a quarter of the 1956 world output of some 80,000 tons.

Nearly 70 per cent of China's total production comes from Kiangsi, where six small districts have three-fourths of all reserves. The veins usually range in width between 6 in. and 2 ft., though some are as much as 10 ft. in width. Many of the veins, which are vertical or steeply sloping, have been mapped for distances of 3,000 ft. along the surface.

Burma has reserves estimated at about 5,000,000 tons of oxide of tungsten (WO_3), which is found in quartz veins, the average WO_3 content being about 1.5 per cent.

In Korea, reserves estimated at about 7,000,000 tons of WO_3 are chiefly of scheelite ore, averaging 1.7 per cent WO_3 content. Other mines operate on wolframite-bearing quartz veins. Less extensive, though still important, tungsten reserves occur in Thailand, Malaya, Indo-China, Japan, and the U.S.S.R.

In Europe, Portugal produces about 7 per cent of the world output, mostly from wolframite-bearing quartz veins, which range up to 5 ft. in width and average 1 per cent in grade. Reserves are placed at about 2,000,000 tons of tungsten oxide.

Spain has important reserves in the same geological structure, but production is small. Small quantities are also produced in France and Sweden, and Cornwall in England.

Bolivia is the largest South American producer, deposits being widely spread through an area known as the tin belt in the eastern Andes, though tungsten ores are not normally mined with tin ores. Both wolframite-bearing veins and scheelite-bearing veins occur, the former being dominant. Ore grades range from 1 to 4 per cent WO_3 .

This is the second part of an adaptation of an article published in the *Stanford Research Institute Journal*, No. 2, 1958, by Richard M. Foose, head of the Earth Sciences Department, Stanford Research Institute, Menlo Park, California. It is continued from our issue of July 17, 1959.

with an average of about 2 per cent. Total reserves are placed at between 5,000,000 and 6,000,000 tons of tungsten oxide.

More than sixty deposits of tungsten ores are found in Brazil which average about $\frac{1}{2}$ per cent WO_3 . Deposits, not yet accurately known, also occur in Argentina, Chile, and Peru, but production has declined considerably in the former country. In Chile and Peru, ore grades range between 0.5 and 2 per cent.

Although the Belgian Congo is the largest producer in Africa, principally as wolframite, with little known reserves, Southern Rhodesia has probably the largest reserves, also in the form of wolframite in quartz veins, and as scheelite in gold-bearing quartz veins. Tungsten mineralization has also been recorded in Angola, Egypt, Nigeria, South West Africa, Tanganyika, Uganda, and South Africa.

One of the largest deposits of scheelite in the world is the King Island deposit in Tasmania, where there are an estimated 2,000,000 tons of 0.7 per cent oxide, along with significant quantities of molybdenum. Several wolframite deposits in Tasmania average 1.25 per cent WO_3 , while in connection with the Aberfoyle tin deposit in Tasmania wolframite is produced as a by-product of cassiterite vein mining.

Canadian reserves are estimated at about 1,000,000 tons of WO_3 , over half of these being associated with limestone in British Columbia. Other smaller reserves occur in Ontario and New Brunswick.

U.S.S.R. reserves are not known, but in 1956 the combined production of tungsten from the U.S.S.R., China, and North Korea are put at about 37 per cent of total world production, and probably 70 per cent of the world's known tungsten reserves are in these three countries.

In the United States, tungsten mineralization is largely concentrated in California, Nevada, and North Carolina, there being only one deposit of any size in the eastern states. Scheelite is produced in greater quantity than wolframite. Total tungsten reserves are estimated at 5,000,000 tons WO_3 , ranging in grade from 0.3 to more than 1 per cent. The lowest grade profitable to work is 0.25 to 0.3 per cent, except when tungsten minerals are produced as a by-product of other operations, as at Climax, Colorado. Production of tungsten has recently fallen off considerably with the removal of government price supports.

The demand for tungsten is expected to increase greatly in the next ten years for high-temperature applications in jet and rocket engines and for the cladding of heat-resistant parts.

The Decline in World Markets for Ceylon Graphite

Ceylon graphite is rapidly losing its grip on its traditional overseas markets. This trend, which has been gradual over the past eight years, has now assumed the proportions of a major catastrophe for the industry. This decline first set in in 1952, when exports fell to 7,659 tons, as compared with 12,620 tons in the previous year. Since then, exports have continued to slide down. Last year, exports at 5,629 tons have slumped to just over half the quantity exported in 1955.

As a result of increasing losses, many small mines have already closed down, and even some of the larger mines are contemplating stopping operations in the absence of relief, despite repeated appeals to the government by the industry. The number of mines working dropped from forty-four in 1955 to twenty in 1957, and last year several more mines, which have not been able to resist the effects of the slack in demand, closed down.

Some of the factors which have played a part in depressing the demand for Ceylon graphite abroad are the perfection of new techniques, which obviate the need to use high carbon content graphite such as Ceylon produces, competition from synthetics, and recourse to cheaper graphite from other producing countries like Brazil and Madagascar. The chief competitors in Ceylon graphite are Madagascar, Norway, and East Africa. The products of these countries are rapidly replacing the Ceylon product in established markets. Added to this is the heavy duty of Rs.50 a ton levied by the Ceylon Government, and the steady increase in freight rates, chiefly as a result of strikes and go-slow movements in the Colombo harbour, which have induced shipping companies to increase freight rates.

Several important markets have already been lost to Ceylon. The principal importers of Ceylon graphite in the past have been the United States, the United Kingdom, Australia, and Japan, while France and Germany have been among a number of smaller importers. Of the larger

markets, only Japan shows continuing interest in Ceylon graphite, but exports to the United States, the United Kingdom, and Australia, have been dwindling rapidly.

The United States, which has been Ceylon's largest buyer, has reduced her purchases from Ceylon by more than half since 1951, when her imports amounted to 99,000 cwt. Last year, she imported only 37,000 cwt. The market in the United States for Ceylon's crystalline flake graphite has been lost entirely to Madagascar, West Germany, British East Africa, and Turkey, who are continuing to strengthen their advantage by further price cuts.

Amorphous graphite constitutes more than 85 per cent of normal United States consumption, which is on the increase, but of a total of 33,248 tons of amorphous graphite used in 1957 only 3,873 tons were from Ceylon. The United Kingdom, which imported 102,141 cwt. of Ceylon graphite in 1951 had reduced her purchases to 64,726 cwt. in 1955. Since then there has been a further progressive reduction to 30,840 cwt. last year. Some United Kingdom firms have indicated that if Ceylon graphite with a carbon content of over 90 per cent is to survive at all in the British market, prices should come down to a minimum of £15 per ton.

Australian purchases have also fallen by about 753 cwt. between 1955 and 1958. Cheap Norwegian and South African graphite is ousting Ceylon's product in this market. Japan has reduced her purchases from Ceylon from 23,320 cwt. in 1955 to 22,100 cwt. last year. It is feared that she may soon switch over to Madagascar entirely for her requirements of crystalline graphite. Meanwhile, the Low Country Products Association of Ceylon has asked the government to abolish the export duty on graphite on the grounds of the present recession. The Association states that the graphite industry is passing through a period of deep depression and the position has been deteriorating in recent months.

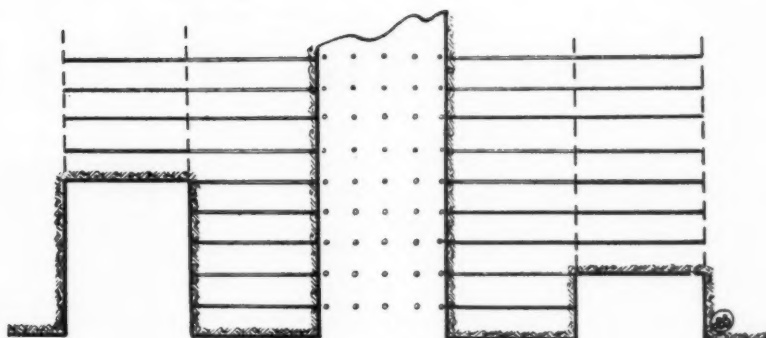
Machinery and Equipment

Satellite Drifting

An important new approach to the driving of closely spaced parallel drifts was described at the recent Symposium on Shaft Sinking and Tunnelling by Professor Janelid of the Technical Institute, Stockholm.

The method is illustrated in the accompanying diagrams. A "parent" drive is first advanced in the usual manner, one or more "satellite" drives being excavated subsequently by means of rows of long parallel blast holes drilled perpendicular to the axis of the parent drive and parallel to the faces of the satellites. These holes are charged, in the first instance, only over the intended cross-sectional area of the satellites, the remaining lengths of uncharged hole being available for later pillar removal if required. Holes must be carefully aligned in both the horizontal and vertical planes and close attention must be paid to the lengths charged if reasonably smooth walls are to result. Even so, drives excavated as satellites may be lacking in exactness of profile, but in the applications suggested this factor would be relatively unimportant.

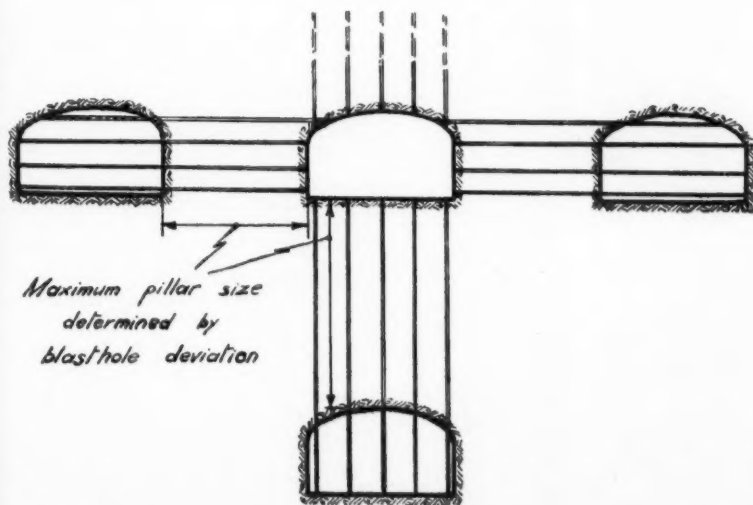
At Kiruna, in the north of Sweden, the new method has been used with notable success to excavate 10 ft. x 16 ft. crosscuts separated by 16 ft. pillars in the extraction of high grade magnetite by sublevel caving. In this case, a burden of almost 4 ft. on the 42 mm. dia. holes gave satisfactory fragmentation with a direct saving of about 20 per cent in footage drilled, irrespective of any use which may be made of holes left in the pillars. Even more important savings in explosives costs are indicated, this resulting from the optimum breaking efficiency of blast holes parallel to the face.



PLAN



This International LTD-20 Bullgrader, powered by a 124 b.h.p. engine, was ordered by the Danish contractor Sören Pedersen of Brande. It will level the hilly wastelands excavated to obtain the valuable lignite deposits which play an important part in Denmark's national economy.



ELEVATION

Satellite drifting will be applied to greatest advantage in mining by room-and-pillar, top slicing or sublevel caving methods in ground which breaks and stands well, where smoothness of profile for ventilation or support purposes is not required and where conditions are such that pillar holes remain open for later use in pillar extraction.

IMPROVED FEATURES ON RESPIRATOR

The Dustfoe 66 respirator, manufactured by Mine Safety Appliances Co. Ltd., has recently been granted H.M. Factory Inspectorate Certificates approving its use under the Asbestos Industry Regulations 1931, Iron and Steel Foundries Regulation 1953, and The Pottery (Health and Welfare) Special Regulations, 1951.

Several new features have been incorporated in the latest model of the respirator which now has a newly contoured face cushion which gives a better and more natural fit and provides much greater wearing comfort.

More sponge stock has been added and this ensures an air-tight seal on most facial types. The sponge neoprene is more durable and will not harden in use. The cushion is easily replaceable.

Newly-designed exhalation valves now fitted to the respirator are larger than those used previously, and reduce resistance to a minimum. They are spring-retained to eliminate the variation in resistance which can be disturbing to the wearer. This system also prevents accidental removal of the valves.

Static web filters are used in the Dustfoe 66 and these are treated with an electrostatically-charged resin. This produces a filter of extremely low breathing resistance, consistent with maximum filtering efficiency.

The filter holder is narrow and this minimises blind spots, giving greatly increased downward vision. The reduced length allows the wearer to bend his head forward without interference.

Another feature of the Dustfoe 66 is counter-gravity flow. Incoming air travels in an upward direction and this helps to reduce the quantity of heavier particles striking the filter.

The complete respirator, including the headband, weighs only three ounces. The band is a two-piece elastic type with positive locking, slide band adjustment and easy snap action with "D" ring release.

Changing of filters and cleaning are simple jobs because of the simplicity of construction of the Dustfoe 66.

MINING MISCELLANY

Over 3,000 tonnes of copper cement have been produced at the Timna works in Israel since running-in operations started last year. Of this, 2,150 tonnes have been exported at a value of \$800,000. It is expected that this year's total production will reach 7,000 tonnes. At the beginning of July, the works achieved its planned daily production level of 25 tonnes. The copper cement, which is sent for further purification abroad, contains 75 per cent copper instead of 65-70 per cent, as mentioned in the original plans. A Japanese industrial mission is expected in Israel at the end of July to discuss a loan to double Timna's output. Israel is to supply copper cement in exchange.

A team of Israeli geologists from the Hebrew University in Jerusalem, the Weizmann Institute of Rehovot, and the Geological Section of the Ministry of Development, is at present on an expedition in East Africa to study the volcanic rocks of the Rift Valley region and to compare conditions with those in the Jordan and Arava valleys (to the south of the Dead Sea). The expedition will take some three months.

The chairman of the Luossavaara-Kiirunavaara AB, Mr. Arnie Lundberg, has expressed optimism regarding the development possibilities under study by the Swedish ore industry. He regards production of up to 23,000,000 tonnes annually within the next decade as possible, depending on the world market situation.

The first pipe-handling tractor built in the U.K. is to be used by Shell-BP in the oilfields in the Niger Delta. Known as the "Michigan" 175A Pipe Handler and made by Michigan (Great Britain) Ltd., the machine will be used to speed up operations in the materials yard at pipeline construction jobs and drilling locations. Designed to lift, and travel, with loads of 14,000 lbs. of tubulars in lengths up to 40 ft., it will also load and unload a 50,000 lbs. pipe-carrying trailer and tow it at speeds up to 27 m.p.h., thereby saving conventional transport and handling equipment



The latest, most extensive overseas tour on which the Mobile Exhibition of George Kent Ltd. is now embarked will not be completed before the end of this year. Scheduled in a continuous programme of on-the-spot demonstrations are visits to the industrial centres of Switzerland, Spain, Yugoslavia and Italy. The picture shows the interior of the Kent Mobile Exhibition on an earlier tour in Sweden



Production is currently around 14,000,000-15,000,000 tonnes annually and is expected to reach 20,000,000 tonnes by 1963.

Overseas visitors to the 1959 Mining Machinery Exhibition at Olympia came from more than 50 countries, including all the Dominions and many other Commonwealth nations. Nearly every European country — on both sides of the Iron Curtain — was represented, while technical representatives were present from the U.S.A., Mexico, Japan, Formosa, the People's Republic of China, South Korea,

Argentina, Bolivia and Colombia. Visitors from a number of Middle East countries — including Israel, Turkey, Iran and Lebanon — also showed a keen interest in the products displayed on the 100 stands at Olympia. More than 800 registrations were received by the Institution of Mining Engineers for the three day Symposium on Shaft Sinking and Tunnelling. Two hundred of the delegates were from 26 overseas countries. The attendances at the various sessions averaged over 400.

The Norwegian iron and mineral undertaking, Christiania Spigerverk, has acquired rich bodies of nepheline ore on Stjernöya (Star Island) on the west coast of Finnmark in northern Norway. The mineral is said to be very rich and pure.

In order to dispose of its production of flotation pyrites concentrates, the Bleikvassli lead-zinc-pyrites mine of northern Norway will erect a sulphuric acid plant on the coast of nearby Rana fiord.

A mission from Southern Africa left recently for South America to attempt to establish a market there for South African coal. It consisted of Dr. P. N. Lategan, chairman of the Transvaal Coal Owners' Association, and Mr. V. Paul, representing the Natal Associated Collieries and Natal Coke Producers. The mission was accompanied by Mr. I. Wishart, managing director of the Wankie Colliery of Rhodesia, who will study the marketing potentialities in South America of coking coal. After talks with government officials and leading industrialists in Argentina, the mission will hold similar talks in Uruguay and Brazil.

Statistics published in Sofia indicate that production in Bulgaria during the first six months of this year exceeded the planned estimate by 1.4 per cent, i.e., 23.4 per cent higher than during the same period of last year. Increases are particularly marked in the mining industry, where the output of coal has gone up by 16.9 per cent, to 7,000,000 tonnes, that of iron ore by 24.3 per cent., and that of non-ferrous metals (lead, zinc, copper) by as much as 32.5 per cent.

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Metals and Minerals

Recovery of the U.S. Titanium Industry

According to Mr. Frank H. Vandenberg, president of the Mallory-Sharon Corporation, titanium metal is now receiving substantial orders from non-defence manufacturers, after several years of dependence on military applications. In 1958, Mallory-Sharon's commercial titanium sales amounted to only 1½ per cent of total sales. In 1959, commercial sales will increase to 5 per cent of the total. Expectations are that this percentage will grow sharply in the years ahead.

Two major factors are contributing to titanium's upswing. Price, of course, is an important question to both military and non-defence buyers. In the face of constantly increasing prices in the basic metals, special metals producers have made sharp price reductions in the past five years. Mallory-Sharon is currently quoting titanium sponge with a Brinell hardness of less than 100 at \$1.62 per lb. Five years ago a lesser quality sponge sold at \$5 per lb. The average price of pure titanium mill products today is \$5.60 per lb., a 52 per cent price reduction since 1954.

Along with price reduction, new alloy research has done much to make titanium useful in wider areas of application.

Because of the increased commercial demand for titanium, and also increased activity in military aircraft and missiles, it now seems certain that the U.S. industry will ship close to 7,000,000 lb. of titanium mill products in 1959, based on average monthly shipments so far of 550,000 lb.

Effective with shipments made on and after August 1, the base prices of titanium metal sponge at E. I. Du Pont de Nemours and Co. will be reduced as follows: A1 grade sponge to \$1.60 per lb. from \$1.82; A2 grade sponge to \$1.50 from \$1.70. The prices quoted are for minimum quantities of 100 lb. f.o.b. Newport, Delaware.

G.S.A. STOPS MANGANESE BUYING

The U.S. General Services Administration has announced that it will buy no more domestic manganese after August 5, when the national stockpile will have reached its limit of 28,000,000 lb. units. Purchase of foreign manganese ceased some time ago.

U.S. manganese producers, most of whom will be forced to shut down production this autumn, were expected to go before the House Ways and Means Committee to protest against the failure of Congress to support domestic production, while the U.S. Government was making funds available to develop manganese in North Africa (i.e., through the World Bank loan to Gabon, reported in our issue of July 10, 1959, p. 34).

NICKEL IN NORWAY

Falconbridge Nikkelverk, of Kristiansand, South Norway, sole Norwegian nickel producers, have virtually completed a ten-year expansion programme which has raised capacity for nickel from 10,000 to 25,000-26,000 tonnes annually, and capacity for copper to 14,000 tonnes from 5,000-6,000 tonnes previously. Output

of cobalt, which was started in 1952, is now around 3,000 tonnes annually. Falconbridge Nikkelverk is a subsidiary of Falconbridge Nickel Mines Ltd.

Nickel-iron deposits on the Island of Homonhon in the Southern Philippines are being exploited by Ferrum Exploration and Development Co., a local mining firm. The sale of laterite to Japanese firms has been negotiated. The first shipment of ore will be made in the natural wet condition, but four portable ore dryers are to be purchased by the company.

ALUMINIUM IN OIL DRILLING

According to *Petroleum Week*, the use of aluminium in oil drilling and production will have increased by 900 per cent by 1965. Quantities of the metal used in these two divisions of the petroleum industry will jump from an estimated 3,500 s.tons to 34,500 s.tons. The largest increase is foreseen for tubular aluminium products, mainly drill pipe.

BORAX PRICES RISE

Borax Consolidated Ltd. has announced that prices of borax and boric acid are to rise from August 17. The increases, ranging from £1 to £2 10s. a ton, will be of the order of 2 per cent.

INDIAN MANGANESE EXPORTS

A public notice issued by the Joint Chief Controller of Exports states that the Indian Government is considering the export policy for manganese ore for the period commencing July 1. Pending an announcement of export policy and individual quotas for the next year (which will be made shortly), the railway authorities will continue allotting wagons during the months of July/August 1959 *pro rata* to the movement quotas registered with them during 1958/59. The quantity so moved will be adjusted against movement quotas for the period 1959/60 (July-June). Shipments of ore lying in ports on or before June 30, or loaded to ports on or before June 30, will be allowed on an *ad hoc* basis against the 1958/59 quota, provided it is proved to the satisfaction of the Export Trade Control authorities that such shipments are to be made against contracts concluded before July 1, 1959, and which are still valid.

JAPAN TO IMPORT MORE CHROME ORE

After a year of business stagnation, Japanese ferro-alloy makers plan to increase their chrome ore imports substantially this year, and South Africa is expected to have a fair share of the increase. Owing to growing demand for ferrochrome from the domestic stainless steel and other consumer industries, the consumption of chrome ore in Japan during the current financial year (April to March) is expected to increase to 139,400 tonnes, compared with 78,520 tonnes in the past financial year. Imports of chrome ore are

accordingly likely to rise from 61,428 to 126,000 tonnes.

Three leading Japanese ferro-chrome producers—Showa Denko, Tekko-Sha, and Nippon Electrolytic Metallurgical—have concluded contracts to import a total of 9,000 tonnes of chrome ore from Turkey for shipment in August or September this year, at an import price of about \$U.S.41 per ton, c.i.f. Japan, for 48 per cent material. This will be Japan's first purchase of chrome ore from Turkey for several years.

LONDON METAL AND ORE PRICES

The following prices, as quoted on July 23, 1959, have changed during the past week:

Gold 249s. 11½d., titanium ore-rutile 95-97 per cent TiO (prompt delivery) £30-£31 per ton c.i.f. Australian.

COPPER · TIN · LEAD · ZINC

The announcement by Phelps Dodge of a cutback in copper production was followed by an announcement from the Rhodesian Selection Trust that its production in the second half of this year would be at the rate of 90 per cent of the first half-year's output. This enabled the customs smelter price to be raised to 29½ c. and the Belgian price to the equivalent of approximately 27/65 c. per lb., New York or Antwerp.

Both the London Metal Exchange and Comex showed momentary strength but prices declined again on a market in which consumers showed little interest. A firmer undertone became evident at the end of the period under review as it became known that the Mine, Mill and Smelter Workers Union's demands on the U.S. copper producers were considered as being unrealistic by the latter.

Both the lead and zinc markets have developed a firmer undertone with buying of nearby lead being a dominant factor.

Tin remains steady with the backwardation continuing and on Thursday the Eastern price was £813½ per ton c.i.f. Europe.

Closing prices up to midday, July 23, are as follows:

	July 16		July 23	
	Buyers	Sellers	Buyers	Sellers
COPPER				
Cash	£226½	£227	£224	£224½
Three months . .	£227½	£228	£225½	£225½
Settlement . . .	£227		£224½	
Week's turnover	17,075 tons		11,725 tons	
LEAD				
Current ½ month	£70½	£70½	£71½	£71½
Three months . .	£70½	£70½	£71½	£71½
Week's turnover	6,700 tons		11,000 tons	
TIN				
Cash	£792	£793	£792½	£793
Three months . .	£790	£790½	£790	£790½
Settlement . . .	£793		£793	
Week's turnover	1,030 tons		890 tons	
ZINC				
Current ½ month	£79½	£80	£80½	£80½
Three months . .	£79½	£79½	£79½	£79½
Week's turnover	6,400 tons		4,975 tons	

Mining Finance

Gold Fields' Bombshell Bid

The news that Consolidated Gold Fields was to bid for the shares of H.E. Proprietary and of New Union Goldfields took the Kaffir market completely by surprise. And, judging from the quite sharp fall in Gold Fields shares, the shock was not entirely pleasant for Gold Fields holders at least. Indeed, the concomitant rise in New Union rather implies that the market felt that the bids were pitched too high.

Certainly, the terms are generous. For each New Union share, Gold Fields is offering one-seventh of a Gold Fields share or 10s. 6d. in cash. H.E. Proprietary holders can choose between one-third of a Gold Fields share or 24s. 6d. in cash. Measured in terms of respective growth potentials or in terms of cash values, the offer for H.E. Proprietary is extremely satisfactory for that company's shareholders, and that for New Union only slightly less so.

The bid marks a further stage in the re-arrangement of the Gold Fields organisation. In particular, Gold Fields say that in recent years they have felt at a disadvantage because, in contrast to the other major South African mining houses (both U.K. and S.A. registered), technical and administrative services for the operating companies of the group are provided from a head office 6,000 miles away. It is proposed that African Land and Investment, the subject of another recent Gold Fields bid, shall become the wholly-owned operating mining house in the Union, and the technical and administrative functions previously carried out in London by New Consolidated will in future be performed by Gold Fields of South Africa in Johannesburg. New Union will find itself in a

rather unusual position within the re-constructed group—a wholly-owned yet separate finance house (as opposed to holding company), operating under the general direction of Gold Fields.

The reasoning behind the H.E. Prop. bid, on the other hand, is more difficult to follow. True, the investments of this comparatively small company are nicely diversified, both within the mining industry and outside it, and, of course, South African H.E. Prop., its subsidiary, is administered by New Union. Nevertheless, the degree of diversification which H.E. Prop. will bring to the group hardly seems important enough to justify a special bid. Possibly more information may be forthcoming at the E.G.M. which Gold Fields will have to call in order to increase its authorised capital.

Financial News and Results

Bay Hall Issue Result.—Of the 2,476,347 Bay Hall Trust ordinary shares recently offered at 10s., only 50,291 (2 per cent.) have been left with underwriters.

Messina Options.—Holders of Messina option certificates are reminded that the last date for exercising their options is July 31 next. The market in these options has been nominal for some time.

Consolidated Tin Mines of Burma.—At a board meeting of Consolidated Tin Mines of Burma on July 21, proposals were considered by the board which may possibly result in an offer of 3d. per share.

LONDON MARKET HIGHLIGHTS

Apart from some hesitancy on Tuesday, the South African Gold share market displayed a very firm undertone last week. Plenty of good features developed, the most striking among them being the burst of strength in St. Helena. This was touched off by the previous week's news contained in the June quarterly of high reef values in the north-eastern part of the mine. The shares which had been 74s. 7½d. on the previous Thursday advanced to a 13-year peak of 81s. 3d. by Wednesday night.

The rich strike was near the Western Holdings boundary and was in line with Holdings No. 3 shaft—where other high values have been found—and the Free State Geduld area of enrichment further to the north. Thus it looked as though this rich underground zone might extend right through the Holdings property and consequently these shares strengthened to 177s. 6d.

The Loraine quarterly, on the other hand, was considered disappointing with its lower values on the Elsburg reefs. But after dropping to 31s. 6d. the price rallied smartly to 34s. 6d. on talk of gold

values having improved since the end of the June quarter.

Features in the Finance group were provided by the surprise take-over bid by Consolidated Gold Fields for New Union and H.E. Proprietary. Gold Fields eased to 73s. 9d. but H.E. Props. jumped 3s. 1½d. to 23s. 6d. and New Union rose to 10s. 3d. during a brisk demand from Johannesburg. Also buoyant were Hendersons (14s. 7½d.) on rather vague take-over rumours. Union Corporation moved up to 70s. in recognition of their important holding of St. Helena.

Copper shares remained in the doldrums but the Messina issues were a firm exception with the shares (112s. 6d.) and options (71s. 3d.) both advancing several shillings. In Lead-zincs week-end Press comment lifted Consolidated Zinc 1s. 9d. to 63s.

Elsewhere, the June quarterly report which told of a fresh setback in profits might have been expected to depress the price of Murchison. But the closing of a sizeable bear position at the Cape resulted in the shares rising 1s. 10½d. to 43s. 1½d.

Company News

Padley and Venables Ltd. and Joy-Sullivan Ltd. have jointly formed a private limited company to be known as Padloy-Sulmet Ltd. of Dronfield, Sheffield, which will confine its activities to the manufacturing and marketing of their respective coal cutter pick production under the trading name of Padloy-Sulmet Ltd. Under this arrangement, their respective trade names of "Padloy" and "Sulmet" will be discontinued as soon as production and marketing arrangements allow. The change-over will be operative from August 1. The two parent companies will continue their separate identities in so far as all their other products are concerned. Servicing and sales arrangements for Padloy-Sulmet Ltd. will be handled by the existing technical and sales staffs of both Padley and Venables and Joy-Sullivan. Padloy-Sulmet Ltd. can be urgently contacted by telephone at Dronfield 3301 (six lines) or by telegram addressed to "EXCAVATE" Dronfield.

Imperial Chemical Industries and Engelhard Industries Inc., New Jersey, U.S.A., have signed an agreement covering the production and sale by the U.S. company of platinum-titanium electrodes using techniques developed by I.C.I.

A Russian order for mining machinery worth well over £250,000 has been secured for Britain. The order was placed with the Holman Group subsidiary, Climax Rock Drill and Engineering Ltd., of Camborne, in conjunction with F. Taylor and Sons (Manchester) Ltd. It follows lengthy negotiations culminating in a visit of representatives of Climax and Taylor to Moscow, and it is also a result of the recent Anglo-Soviet trade agreement. Climax have been supplying mining equipment to Russia for the past 30 years. The main part of the present order involves rock drilling equipment. Caterpillar tracked mobile drilling rigs will be supplied, each mounting four Holman medium weight drifters on hydraulic booms. They are designed to drill faces up to 32 ft. high. Also included in the order are a number of track mounted telescopic carriages, which can be raised to a height of over 80 ft. These raised platforms will be used for roof scaling operations and also for roof bolting.

The Consolidated Pneumatic Tool Co. Ltd. of 232 Dawes Road, London S.W.6, announce that their parent company, the Chicago Pneumatic Tool Co., New York, has acquired the Reich Bros. Manufacturing Co. Inc., of Terre Haute, Ind., U.S.A., producers of the internationally known Reich line of truck and crawler-rigs for down-the-hole blast hole operations. The acquisition also includes the Reichdrill Manufacturing Co. Ltd., of Glasgow, which will, henceforth, operate as the Reichdrill Division of Consolidated Pneumatic. As a result of the acquisition, the Consolidated Pneumatic Range of equipment now covers the entire field of drilling operations for the construction, petroleum, coal and metal mining industries.

VACANCY arising shortly for qualified mining engineer for position as underground superintendent in West Africa. Salary according to qualifications and experience. Write, giving age and full particulars of experience to Box 109, c/o Barker and Howard, 79 Fenchurch Street, London E.C.3.

EAST RAND CONSOLIDATED

MR. C. J. BURNS' STATEMENT

The thirty-third annual general meeting of East Rand Consolidated Ltd. was held on July 22 at the Chartered Insurance Institute, London E.C.

Mr. C. J. Burns, Chairman, presided.

The following is an extract from his Statement circulated with the Report and Accounts:—

The Accounts for the year to December 31, 1958, show a profit of £55,972, out of which a dividend of 8½ per cent. (2d. per share) is recommended absorbing £30,625. Although the profit is slightly less than that for 1957, the Company's position has materially improved since this time last year. Dividend income has increased from £30,759 to £45,062, while at the present time our quoted investments with a book value of £554,485 have a market valuation of £629,529.

The Company's interests are gradually being expanded and during the year we have incurred expenditure not only on our own account but also in conjunction with others in investigating mining propositions in South Africa and in certain limited prospecting operations. We have also continued to examine the possibilities for investing in industrial ventures both in the United Kingdom and overseas. As will be seen from the total sum invested in market securities, the Company has adequate resources available if a suitable proposition is forthcoming.

The Report and Accounts were adopted and the dividend approved.

ASHANTI GOLDFIELDS CORPORATION LIMITED

Notice is hereby given that the Board of Directors have today declared an Interim Dividend (No. 125) on the Issued Capital of the Corporation at the rate of 1s. per Share, less Income Tax at 7s. 9d. in the £. This Dividend which is in respect of the year ending September 30, 1959, to be payable on and after September 15, 1959, to all Shareholders on the Registers on July 24, 1959.

The Transfer Books will be closed from July 25, 1959, to August 3, 1959, both dates inclusive, for the preparation of Dividend Lists.

By Order of the Board,
E. W. MORGAN,
Secretary.

Registered Address:
10 Old Jewry, London, E.C.2.
July 21, 1959.

BIBIANI (1927) LIMITED

Notice is hereby given that the Board of Directors have today declared an Interim Dividend (No. 41) on the Issued Capital of the Company at the rate of 2½d. per Share, less Income Tax at 7s. 9d. in the £. This Dividend which is in respect of the year ending September 30, 1959, to be payable on and after September 15, 1959, to all Shareholders on the Registers on July 24, 1959.

The Transfer Books will be closed from July 25, 1959, to August 3, 1959, both dates inclusive, for the preparation of Dividend Lists.

By Order of the Board,
E. W. MORGAN,
Secretary.

Registered Address:
10 Old Jewry, London E.C.2.
July 21, 1959.

BREMANG GOLD DREDGING

The Twenty-second Annual General Meeting of Bremang Gold Dredging Co. Ltd. was held on July 10 in London.

Mr. C. J. Burns, Chairman, presided, and the following is an extract from his circulated statement:—

The results for the year 1958 have been most satisfactory and the profits have been more than doubled, rising from £70,860 to £154,036. After writing off Dredge Removal Expenditure, Debenture Issue Expenses, and allowing for the payment of a Dividend of 7½ per cent., and Profits Tax thereon, there remains a balance of unappropriated profit amounting to £89,644.

The first instalment of the Ghana Government grant is due for repayment in July 1960 and the 6 per cent. Debenture held by Western Selection and Development Co. Ltd. is due to be repaid in December 1961. Western Selection have agreed to defer the repayment of their Debenture until December 31, 1962, and have been granted the right to convert £100,000 of their Debenture into shares at par. They propose to exercise the right to take up the 1,000,000 shares as at July 1, 1959, and this will reduce the amount outstanding under their Debenture to £100,000. The effect of this arrangement will be to enable the Company to repay the Ghana Government Debenture in a shorter period.

The future for your Company is an attractive one; operating results for the first five months of the current year fully justify such an expression of confidence. Operating profits for the period amount to £125,458, compared with £87,721 for the corresponding five months of 1958. It is important to realise that until May 15, 1959, only three Dredges were in operation. Since that date, with the inauguration of No. 3 Dredge, we shall have four Dredges operating without the necessity of further removals.

We can therefore look back with satisfaction and forward with confidence.

The report and accounts were adopted.

GOLD AND BASE METAL MINES OF NIGERIA

The twenty-fifth annual general meeting of Gold & Base Metal Mines of Nigeria Ltd. was held on July 23, at the Chartered Insurance Institute, London E.C.

Mr. A. Hedley Williams, M.I.M.M., a director, presided.

The following is an extract from the Statement of the Chairman, Major-Gen. W. W. Richards, circulated with the Report and Accounts:—

The results of our financial year to December 31, 1958, reflect the effect of the first full year of operations under the International Tin Agreement as a result of which this Company's exports of tin concentrates were restricted to 398 tons against 1,168 tons for the previous 12 months.

Columbite production for the year was nominal but in view of the firmer demand which has in recent months become apparent, the Company has now resumed production on a limited scale at Lirue. As tin is mined in association with columbite in this area, and as, owing to distance, it is the highest cost area, it is not economic at present for the Company to revert to full scale production from this property which in 1957, the last full year before

Restriction, produced 360 tons of tin concentrates and 122 tons of columbite. Under present conditions it is hoped to raise columbite output to 50 tons for 1959, and for the 5 months to date, 18 tons have been recovered.

Our policy during this most difficult year has been to continue with our previous plans of securing the Company's long term future, but not to incur expenditure in blocking out ore reserves by detailed close drilling when Restriction precludes the possibility of mining those reserves during the next few years. Our geological investigations at Jema'a have initially been concentrated on the south and west perimeters of the Special Exclusive Prospecting Licence with the object of withdrawing inwards to the known extensive mineralisation on the eastern boundary against which we have already built up a large block of leases. We have, however, in accordance with our established practice, written off all such expenditure in the year in which it is incurred, although the advantage thereof lies in the future.

The report and accounts were adopted.

Publications Received

South Africa, thanks to the Electricity Supply Commission (ESCOM), has an outstanding reputation for the provision of electrical power at a low figure. In 1956, the average price per unit sold by Escm (which now supplies 80 per cent of the electrical power in South Africa) was 0.5142d. It is scarcely surprising, therefore, that the consumption of electricity in South Africa should have been doubled in the past seven years. Modernization and expansion programmes now under way include the further electrification of the South African Railways, estimated at £37,000,000, and much larger developments in telecommunications services initiated by the Post Office at a cost of £93,000,000.

Across the border, too, electrical consumption is very rapidly expanding, and will be given a further impetus by the Kariba hydroelectric undertaking. For the year ending June 30, 1958, sales by the Southern Rhodesian Electricity Supply Commission amounted to 677,372,226 units, being an increase of 9.39 per cent.

The rapid tempo of expansion enhances the value of the *South African Electrical Yearbook*, the 1959 issue of which is now available. (Price 63s.). The publication contains articles covering many aspects of the electrical industry, as well as a Directory Section listing power supply undertakings, electrical contractors, electrical firms, consulting engineers, and overseas electrical manufacturers.

The publishers are the South African Engineer and Electrical Review (Pty.) Ltd., P.O. Box 3273, Johannesburg.

**THE INDUSTRIAL MACHINE
AND ENGINEERING WORKS,
KALIPAHARI, INDIA** wish to obtain collaboration from British manufacturers for Mine Pumps, Haulages, Light Fittings, Shaft Signalling and other ancillary equipment to be manufactured in India. Interested people kindly correspond Mr. P. P. Jain, c/o Overseas Mining and Engineering Equipment Co. Ltd., 308 Regent Street, London, W.1.

FIRM and FLEXIBLE that's MacLellan HOSE SERVICE

Hose buyers who require standard grades for suction or discharge can depend on MacLellan quality and suitability for service conditions. These are firm and definite. When the need is for special lengths, special sizes or special construction you will find MacLellan co-operative, knowledgeable and helpful. The experience of eighty years of rubber manufacture, and plant as modern as any in the country, enable MacLellan to meet the varied needs of every hose user. Please let us know yours.



A Geordie among the shrewd, straight-speaking Geordies, Reg Irving is the MacLellan Manager in the North-East. His energy, the stocks carried at his depot, and his knowledge of hose application have made him many friends from Morpeth to Middlesbrough. In his spare time, he is a member of a male voice choir. As a solo turn he sings the praises of MacLellan Hose.

MacLellan HOSE

George MacLellan & Co. Ltd.

For over 80 years makers of rubber for industry: suction and discharge hose, conveyor belting for out-door and underground service, expansion joints, rubber jointing and cut joints, Macbond rubber and ebonite lining and covering, Mactex rubber buckets, roller and idler covers, asbestos millboard, protective clothing.

GLASGOW: 143-153 Shuna Street, Glasgow, N.W.

Telephone: Maryhill 5111/9.

Telegrams: 'Caoutchouc' Glasgow

LONDON: Burston Road, Putney, S.W.15.

Telephone: Putney 5678.

BELFAST: 60b North Queen Street.

Telephone: Belfast 22822.

NEWCASTLE UPON TYNE: 3-5 Queen Street.

Telephone: Newcastle 27617.

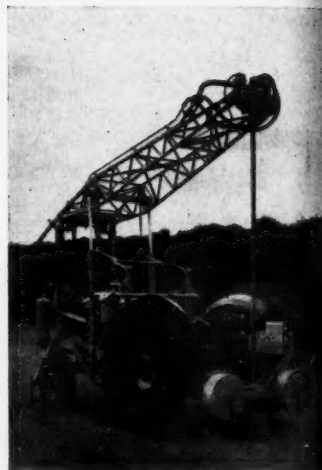
TECHNICAL REPRESENTATIVES THROUGHOUT THE COUNTRY

300 P.A. TRACTOR DRILLMASTER MULTI-PURPOSE · HIGHLY MOBILE

On right is the Hands-England Drillmaster 300 P.A. Rotary Drill mounted on a Fordson Major Industrial Tractor. This design provides great manoeuvrability and is intended primarily to enable the H/E Drillmaster 300 P.A. Rotary Drill to be used for Quarry and Open Cast blast hole, shot hole, auger, core or sample drilling, and although ideal for this, it is equally applicable to some difficult "off the road" locations, such as may be encountered during seismic exploration or shot hole drilling. Standard equipment provides for drilling holes of 2½" to 4" in diameter or to ream out 2½" diameter holes to larger sizes. Extra equipment can be supplied for cutting larger holes up to 5½" diameter. For flushing cuttings

to the surface an air compressor can be mounted directly on the H/E Tractor Drillmaster and driven by the Tractor Engine. The compressor can achieve an

up-hole annular velocity of 3,000 ft. per min.—using 'B' rod and 3" dia. bits. If air drilling is to be employed for larger holes, or where mud circulation is necessary, the equipment for these operations must be mounted on a separate trailer or tractor



The illustration above shows the H/E Tractor Drillmaster during drilling operations in an Open Cast site.

The illustration on right shows the H/E Tractor Drillmaster during drilling operations in a quarry.



OTHER HANDS-ENGLAND EQUIPMENT INCLUDE:

Truck Winches — Jetting Drills — Drill Pipes — Breast Reels — Explosives Loading Poles — Collapsible Canvas Water Tanks — Cool Water Cans — Stainless Steel Developer Pots — Geophone Planting Cups — Well Survey Winches — Vacuum Lift Valves — Gravity Cushioned Fifth Wheels — Oilfield Bodies — Self-Loading Semi-Trailers — Pipe Winches.

Write for illustrated folders and full details quoting reference A/TD

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B.M.J.

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